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STATE OF HAWAII
DEPARTMENT OF HEALTH
CLEAN AIR BRANCH

2002

Annual Summary
Hawaii Air Quality Data


Hanalei Bay, Kauai


Hanalei Valley, Kauai

2002
HAWAII AIR QUALITY DATA

Contents

LIST OF TABLES

LIST OF FIGURES

Section 1

INTRODUCTION

The Department of Health, Clean Air Branch, monitors the ambient air in the State of Hawaii for various gaseous and particulate air pollutants. The Environmental Protection Agency (EPA) has set national ambient air quality standards (NAAQS) for six criteria pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter (PM_{10} and $PM_{2.5}$). Hawaii has also established a state ambient air standard for hydrogen sulfide. The primary purpose of the statewide monitoring network is to measure ambient air concentrations of these pollutants and ensure that these air quality standards are met.

Air pollution is caused by many different man-made and natural sources. There are industrial sources of pollution, such as power plants and refineries; mobile sources, such as cars, trucks, and buses; agricultural sources, such as cane burning; and natural sources, such as windblown dust and volcanic activity. In 2002, the State maintained 15 air monitoring stations on 4 islands. Most commercial, industrial, and transportation activities and their associated air quality effects occur on Oahu, where 9 of the stations are located. Maui and Kauai each have one monitoring station, mainly to measure the air quality impacts from agricultural activities. The ongoing eruption of the Kilauea Volcano and air quality impacts associated with geothermal energy production are being monitored at 4 stations on the island of Hawaii. Current plans are to continue sampling at these sites; however, relocations, additions and/or discontinuations can occur in the future as the need arises.

This report summarizes the validated air pollutant data collected at the 15 monitoring stations during calendar year 2002. Tabular summaries are provided which compare the measured concentrations with federal ambient air quality standards. Trend summaries of pollutants that have at least 5 years of data are depicted graphically.

The Department of Health also has a web site that displays near real-time air quality data from specific monitoring stations on Oahu and the Big Island. Data is posted approximately 3 hours after collection and is updated throughout the day. The data has not been reviewed for quality assurance and is subject to change but provides the public with viewing access to current air pollutant and meteorological information. To view the daily air quality data on the Internet, go to: www.state.hi.us/doh/air-quality

This entire book can also be viewed online at: www.state.hi.us/doh/eh/cab/index.htm

Questions or comments regarding data in this report and other air quality information should be addressed to:

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Section 2
DEFINITIONS

"Ambient Air": The general outdoor atmosphere, external to buildings, to which the general public has access.

"Ambient Air Quality": The quality or state of purity of the ambient air.

"Ambient Air Quality Standard": A limit in the quantity and exposure to pollutants dispersed or suspended in the ambient air. Primary standards are set to protect public health, including sensitive populations such as asthmatics, children, and the elderly. Secondary standards are set to protect public welfare including protection against visibility degradation, and damage to animals, crops, vegetation and buildings.

"Carbon Monoxide": Carbon monoxide (CO) is a colorless, odorless, tasteless gas under atmospheric conditions. It is produced by the incomplete combustion of carbon fuels with the majority of emissions coming from transportation sources.

"Collocated": Procedure required for a certain percentage of PM_{10} and $PM_{2.5}$ samplers in the monitoring network. Collocated samplers determine precision or variation in the PM_{10} or $PM_{2.5}$ concentration measurements of identical samplers run in the same location under the same sampling conditions.

"EPA": The United States Environmental Protection Agency. A federal agency established to protect human health and the natural environment.

"Hydrogen Sulfide": Hydrogen sulfide (H_2S) is a toxic, colorless gas with a characteristic "rotten egg" odor detectable at very low levels. Also

known as sewer gas, it is naturally occurring from sources such as volcanic activity, geothermal energy exploration and bacterial decomposition of organic matter.

$\mu g/m^3$: Micrograms per cubic meter. This is the measurement of air quality expressed as mass per unit volume.

"NAAQS": National Ambient Air Quality Standards. These are pollutant standards that the EPA has established to protect public health and welfare. NAAQS have been set for carbon monoxide, nitrogen dioxide, PM_{10}, $PM_{2.5}$, ozone, sulfur dioxide, and lead. These are commonly referred to as criteria pollutants.

"NAMS": National Air Monitoring Stations. A subset of the SLAMS network, these sites are used to track trends in certain pollutants and must meet more stringent siting requirements, equipment type, and quality assurance criteria.

"Nitrogen Dioxide": Nitrogen dioxide (NO_2) is a brownish, highly corrosive gas with a pungent odor. It is formed in the atmosphere from emissions of nitrogen oxides (NO_x). Sources of nitrogen oxides include electric utilities, industrial boilers, motor vehicle exhaust and combustion of fossil fuels. NO_2 is also a component in the atmospheric reaction that produces ground-level ozone.

"Ozone": This is the main constituent in photochemical air pollution. It is formed in the atmosphere by a chemical reaction of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. In the upper atmosphere, ozone (O_3) shields the earth from harmful ultraviolet radiation; however, at ground level, it can cause harmful effects in humans and plants.

"Particulate Matter": Any dispersed matter, solid or liquid, in which the individual aggregates are larger than the single molecules in diameter, but smaller than 500 microns. Particulate matter includes dust, soot, smoke, and liquid droplets from sources such as factories, power plants, motor vehicles, construction activities, agricultural activities, and fires.

"PM_{10}": Particulate matter that is 10 microns or less in aerodynamic diameter. These are considered "coarse" particles generally from sources such as road and windblown dust, and crushing and grinding operations.

"$PM_{2.5}$": Particulate matter that is 2.5 microns or less in aerodynamic diameter. Considered "fine" particles, these are generally a result of fuel combustion

such as from motor vehicles, utility generation and industrial facilities. Fine particles can also be formed when gases, such as SO_2 and NO_2, are chemically transformed into particles.

"SLAMS" State and Local Air Monitoring Stations. The Clean Air Act requires that every state establish a network of air monitoring stations for criteria pollutants, using requirements set by the EPA Office of Air Quality Planning and Standards.

"Sulfur Oxides": Sulfur oxides are colorless gases which include sulfur dioxide (SO_2), sulfur trioxide, their acids and the salts of their acids. Emissions of sulfur oxides are largely from sources that burn fossil fuels such as coal and oil. In Hawaii, another major source of sulfur oxide emissions is from the eruption of Kilauea Volcano on the Big Island.

"Vog": Vog is a local term used when volcanic gas and particles combine with air and sunlight to produce atmospheric haze.

Table 2-1 **State of Hawaii and Federal Ambient Air Quality Standards**

Air Pollutant	Averaging Time [a]	Standards		
		Hawaii State Standard [b] ($\mu g/m^3$)	Federal Primary Standard [c] ($\mu g/m^3$)	Federal Secondary Standard [d] ($\mu g/m^3$)
Carbon Monoxide	1-hour 8-hour	10,000 5,000	40,000 10,000	40,000 10,000
Nitrogen Dioxide	Annual	70	100	100
PM_{10}	24-hour Annual	150 50	150 50	150 50
$PM_{2.5}$	24-hour Annual	--- ---	65 15	65 15
Ozone	1-hour 8-hour	--- 157	235 157	235 157
Sulfur Dioxide	3-hour 24-hour Annual	1,300 365 80	--- 365 80	1,300 --- ---
Lead [e]	Calendar Quarter	1.5	1.5	1.5
Hydrogen Sulfide	1-hour	35	—	---

[a] All averaging times are based on block averages except for the 8-hour ozone standard, which is based on running 8-hour periods

[b] Designated to protect public health and welfare and to prevent the significant deterioration of air quality. *Source: HAR §11-59-1*

[c] Designated to prevent against adverse effects on public health. *Source: 40CFR Part 50*

[d] Designated to prevent against adverse effects on public welfare, including effects on comfort, visibility, vegetation, animals, aesthetic values, and soiling and deterioration of materials. *Source: 40CFR Part 50*

[e] Ambient air monitoring for lead was discontinued in October 1997 with EPA approval. Levels in the state were far below the federal standard since sampling began. With the elimination of lead in gasoline, measured levels were consistently zero or nearly zero.

Section 3
SITE LOCATIONS AND DESCRIPTIONS

This section provides detailed descriptions of the monitoring stations in the State of Hawaii. Table 3-1 lists the air pollutant(s) measured at each monitoring station, characterizes the area surrounding the station, and indicates the start dates for data collection. Table 3-2 identifies the type of sampler used to measure the concentration of each air pollutant. Figures 3-1, 3-2, 3-3 and 3-4 are maps showing the location of each monitoring station on the islands of Oahu, Kauai, Maui and Hawaii, respectively.

ISLAND OF OAHU

1. Honolulu: Located atop the Department of Health building (Kinau Hale) at 1250 Punchbowl Street in downtown Honolulu, this site is in a commercial, institutional, and residential area. It was established in April 1971 as a NAMS (PM_{10} , CO) and SLAMS station. The pollutants sampled at this site are PM_{10}, $PM_{2.5,}$ CO, and $SO_{2.}$ The coordinates are 21°18'27.27098" N latitude and 157°51'19.52241"W longitude.

2. Pearl City: Located atop the Leeward Medical Center at 860 Fourth Street, the area has a combination of commercial, industrial and residential units and is approximately nine and a half miles northwest of downtown Honolulu. This NAMS site was established in April 1971 and currently monitors for PM_{10} and $PM_{2.5.}$ The coordinates are 21°23'34.19856" N latitude and 157°58'08.85360" W longitude.

3. Waimanalo: Located within the Waimanalo Sewage Treatment Facility at 41-1069 Kalanianaole Highway, this site is in a rural agricultural community. Waimanalo is on the windward (upwind) side of Oahu approximately ten miles east-northeast of downtown Honolulu. This site was established in July 1989 as a SLAMS site sampling for $PM_{10.}$ The coordinates are 21°20'16.21667" N latitude and 157°42'16.6539" W longitude.

4. Sand Island: Located at the University of Hawaii's Anuenue Fisheries, the area is composed of light industrial, commercial, recreational, and harbor units and is approximately two miles southwest (typically downwind) of downtown Honolulu. This is a NAMS station that was established in February 1981 and samples for ozone and $PM_{2.5}$. The coordinates are 21°18'13.81750" N latitude and 157°52'16.21590" W longitude.

5. Waikiki: Located at 2131 Kalakaua Avenue, Waikiki is a busy commercial and residential area with vehicular and pedestrian traffic. It is approximately three miles southeast of downtown Honolulu. The station was established in January 1981 as a NAMS site for the sampling of carbon monoxide. The coordinates are 21°16'53.86923" N latitude and 157°49'50.70880" W longitude.

6. Liliha: Located at Kauluwela Elementary School, 1486 Aala Street, this site is in a residential and commercial area near the heavily traveled H-1 freeway, approximately one and a quarter miles north of downtown Honolulu. This NAMS station was established in January 1984 and monitors for PM_{10}. The coordinates are 21°19'08.57706" N latitude and 157°51'31.84786" W longitude.

7. Makaiwa: Located at 92-670 Farrington Highway, this site is in a residential, industrial and agricultural area approximately twenty-five miles west of downtown Honolulu. This station is downwind and to the southeast of an electrical power plant. This site was established in July 1989 as a SLAMS station monitoring for SO_2. The coordinates are 21°20'39.36299" N latitude and 158°06'46.67939" W longitude.

8. West Beach: Located within the Ko'Olina Golf Course, this site is in a resort, recreational, and residential area approximately 27 miles west of downtown Honolulu and 1.5 miles northwest of Campbell Industrial Park. This SLAMS station was established in February 1991 and monitors for NO_2, PM_{10}, CO, and SO_2. The coordinates are 21°19'57.87475" N latitude and 158°06'50.86663" W longitude.

9. Kapolei: This station was located at 91-591 Kalaeloa Boulevard until July 15 but was moved approximately 300 yards to the south and began operation at this new site on July 26. The new location is at 2052 Lauwiliwili Street in a commercial and industrial area with nearby residential and agricultural lands. It is approximately 25 miles west of downtown Honolulu originally established in February 1991 as a SLAMS site. Air pollutants measured at the site include NO_2, PM_{10}, $PM_{2.5}$, CO and SO_2. The coordinates for the old station at 91-591 Kalaeloa Boulevard was 21°19'33.35524" N latitude and 158°05'22.09459" W longitude. The coordinates for the new site at 2052 Lauwiliwili Street are 21°19'25.48126" N latitude and 158°05'19.00562" W longitude.

ISLAND OF KAUAI

Lihue: This monitoring station is located in downtown Lihue at the District Health Office, 3034 Umi Street. This site is in a commercial and residential area with nearby agricultural areas. It is a SLAMS station that was established in November 1972 and samples for $PM_{10.}$ The coordinates are 21°58'28.84947" N latitude and 159°21'58.09671" W longitude.

ISLAND OF MAUI

Kihei: This station is located in Hale Piilani Park. Monitoring for particulates from sugarcane burning activities has been conducted in the Kihei area since 1996. In February 1999, the station was moved to Hale Piilani Park, which is in a residential and agricultural area, and monitors for PM_{10} and $PM_{2.5}$. The coordinates are 20°46'51.58844" N latitude and 156°26'46.94337" W longitude.

ISLAND OF HAWAII

1. Kona: This station is located on the grounds of the Konawaena High School at 81-1043 Konawaena School Road in Kealakekua, Hawaii. This special purpose monitoring station was established in April 1997 to monitor vog in the Kona area. The pollutant sampled at this site is $SO_{2.}$ The coordinates are 19°30'27.83302" N latitude and 155°55'03.67861" W longitude.

2. Hilo: Established in March 1995, this station is located on the grounds of the Adult Rehabilitation Center of Hilo at 1099 Waianuenue Avenue to monitor vog. The pollutants sampled are SO_2 and PM_{10}. The coordinates are 19°43'03.22398" N latitude and 155°06'37.90606" W longitude.

3. Lava Tree: This station in Puna is located on the eastern border of the Lava Tree State Park in a residential-agricultural area near Nanawale Estates. It is approximately 1.4 miles northwest of the Puna Geothermal Venture power plant. The station was established in August 1993 and monitors for H_2S. The coordinates are 19°29'11.06393" N latitude and 154°54'11.22523" W longitude.

4. Puna E: Located in the Leilani Estates residential subdivision in Puna, it is approximately 3 miles south-southwest of the Puna Geothermal Venture power plant. Established in 1992, this station monitors for H_2S. The coordinates are 19°27'50.3594" N latitude and 154°53'55.34089" W longitude.

Table 3-1 **State of Hawaii Air Monitoring Network**

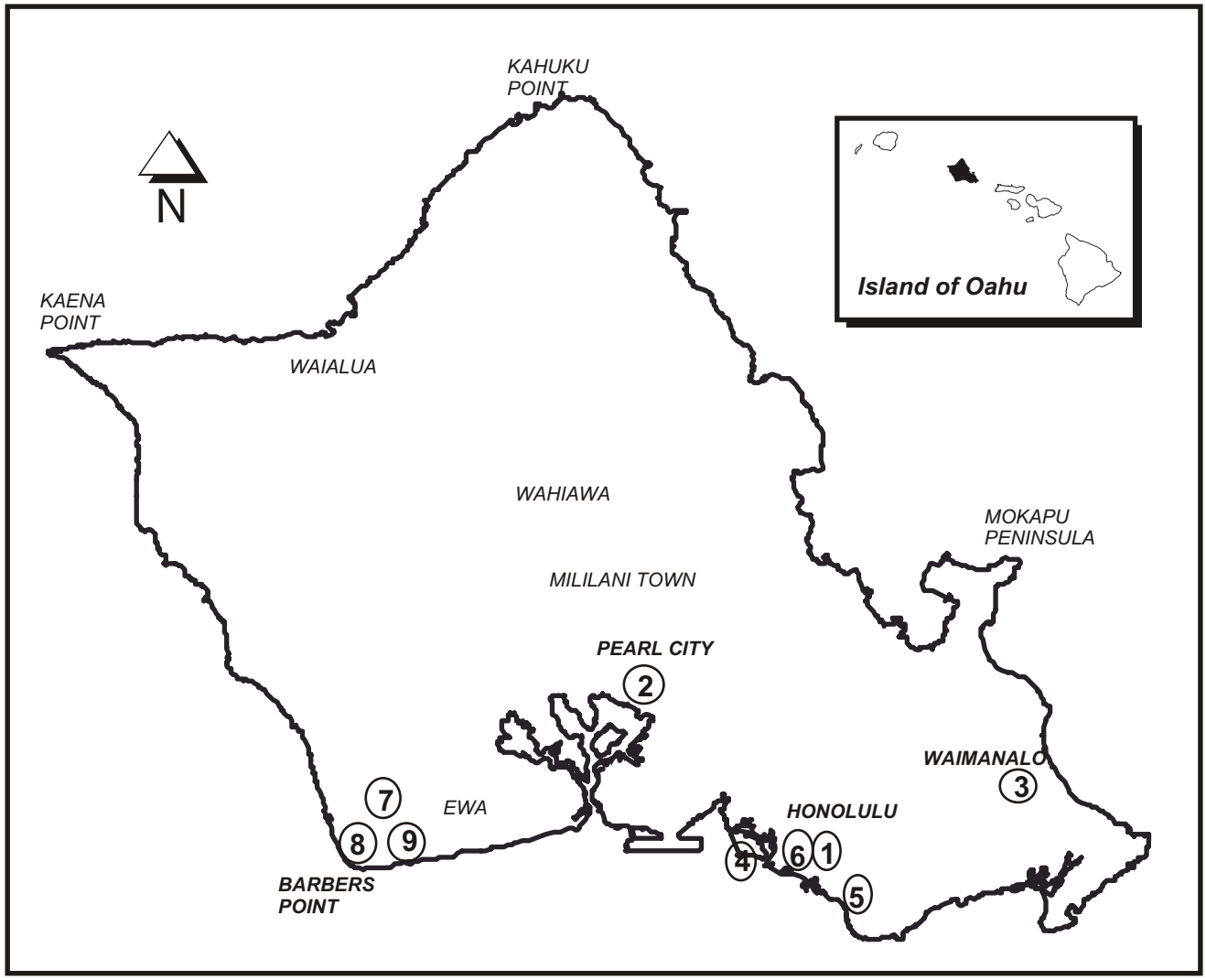
SITE	Station Type							SITE DESCRIPTION	START DATE
	PM_{10}	$PM_{2.5}$	CO	O_3	SO_2	NO_2	H_2S		
OAHU									
Honolulu	N	S, C	N	-	S	-	-	Center City / Commercial	April 1971
Pearl City	N	S, C	-	-	-	-	-	Suburban / Residential	April 1971
Waimanalo	S	-	-	-	-	-	-	Rural / Agricultural	July 1989
Sand Island	-	S	-	N	-	-	-	Center City	January 1981
Waikiki	-	-	N	-	-	-	-	Center City	January 1981
Liliha	N	-	-	-	-	-	-	Center City	January 1984
Makaiwa	-	-	-	-	S	-	-	Rural / Industrial	July 1989
West Beach	S, C	-	S	-	S	S	-	Rural / Industrial	February 1991
Kapolei	S	S	S	-	S	S	-	Rural / Industrial	February 1991 (moved July 2002)
KAUAI									
Lihue	S	-	-	-	-	-	-	Center City / Commercial	October 1985
MAUI									
Kihei	SPM	S	-	-	-	-	-	Suburban / Residential	February 1999
HAWAII									
Kona	-	-	-	-	SPM	-	-	Suburban	April 1997
Hilo	SPM	-	-	-	SPM	-	-	Center City	March 1995
Lava Tree	-	-	-	-	-	-	SPM	Rural / Agricultural	August 1993
Puna E	-	-	-	-	-	-	SPM	Rural / Agricultural	1992

N = (NAMS) National Air Monitoring Station
C = Collocated Site
S = (SLAMS) State and Local Air Monitoring Station
SPM = Special Purpose Monitoring Station (for monitoring of sugar cane burning, vog, or geothermal energy production)

Table 3-2 **Sampling Equipment at Each Monitoring Station**

Monitoring Station	Sampling Method							
	PM_{10} Continuous Ambient Particulate Monitor	PM_{10} Manual Ambient Particulate Monitor (1 in 6 days)	$PM_{2.5}$ Manual Ambient Particulate Monitor	CO Continuous Gas Filter Correlation Analyzer	SO_2 Continuous Pulsed Fluorescence Ambient Air Analyzer	O_3 Continuous UV Photometric Analyzer	NO_2 Continuous Chemiluminescence Analyzer	H_2S Continuous Pulsed Fluorescence Ambient Air Analyzer
OAHU Honolulu	✔		✔ (daily)	✔	✔			
Pearl City	✔		✔ (daily)					
Waimanalo		✔						
Sand Island			✔ (1 in 6 days)			✔		
Waikiki				✔				
Liliha	✔							
Makaiwa					✔			
West Beach		✔		✔	✔		✔	
Kapolei	✔		✔ (1 in 3 days)	✔	✔		✔	
KAUAI Lihue		✔						
MAUI Kihei	✔		✔ (1 in 3 days)					
HAWAII Kona					✔			
Hilo		✔			✔			
Lava Tree								✔
Puna E								✔

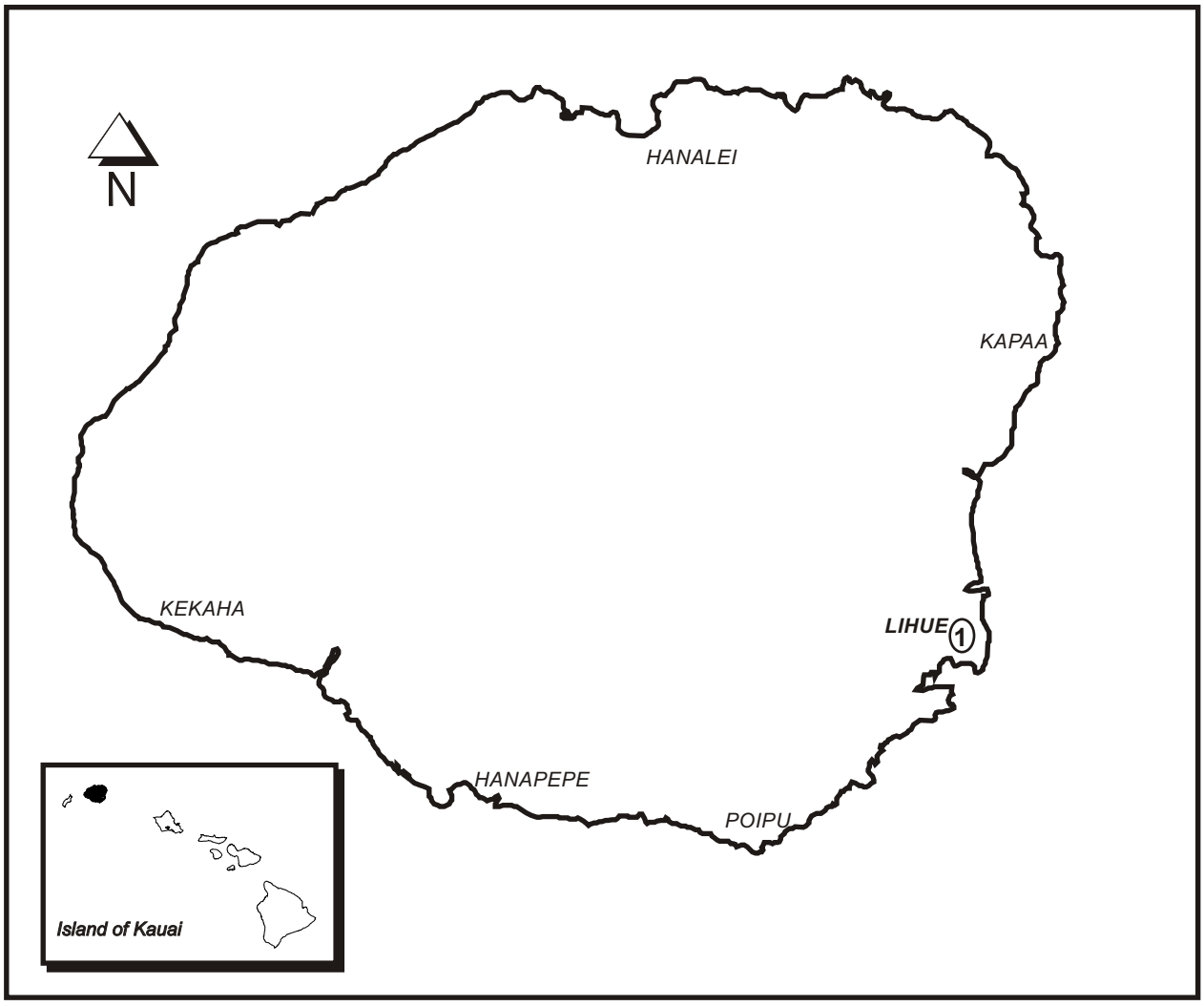
Figure 3-1 **Island of Oahu: Location of Air Monitoring Stations**



LEGEND

1 Honolulu (PM_{10}, $PM_{2.5}$, SO_2, CO)
2 Pearl City (PM_{10}, $PM_{2.5}$)
3 Waimanalo (PM_{10})
4 Sand Island (O_3, $PM_{2.5}$)
5 Waikiki (CO)
6 Liliha (PM_{10})
7 Makaiwa (SO_2)
8 West Beach (PM_{10}, SO_2, NO_2)
9 Kapolei (PM_{10}, $PM_{2.5}$, SO_2, CO, NO_2)

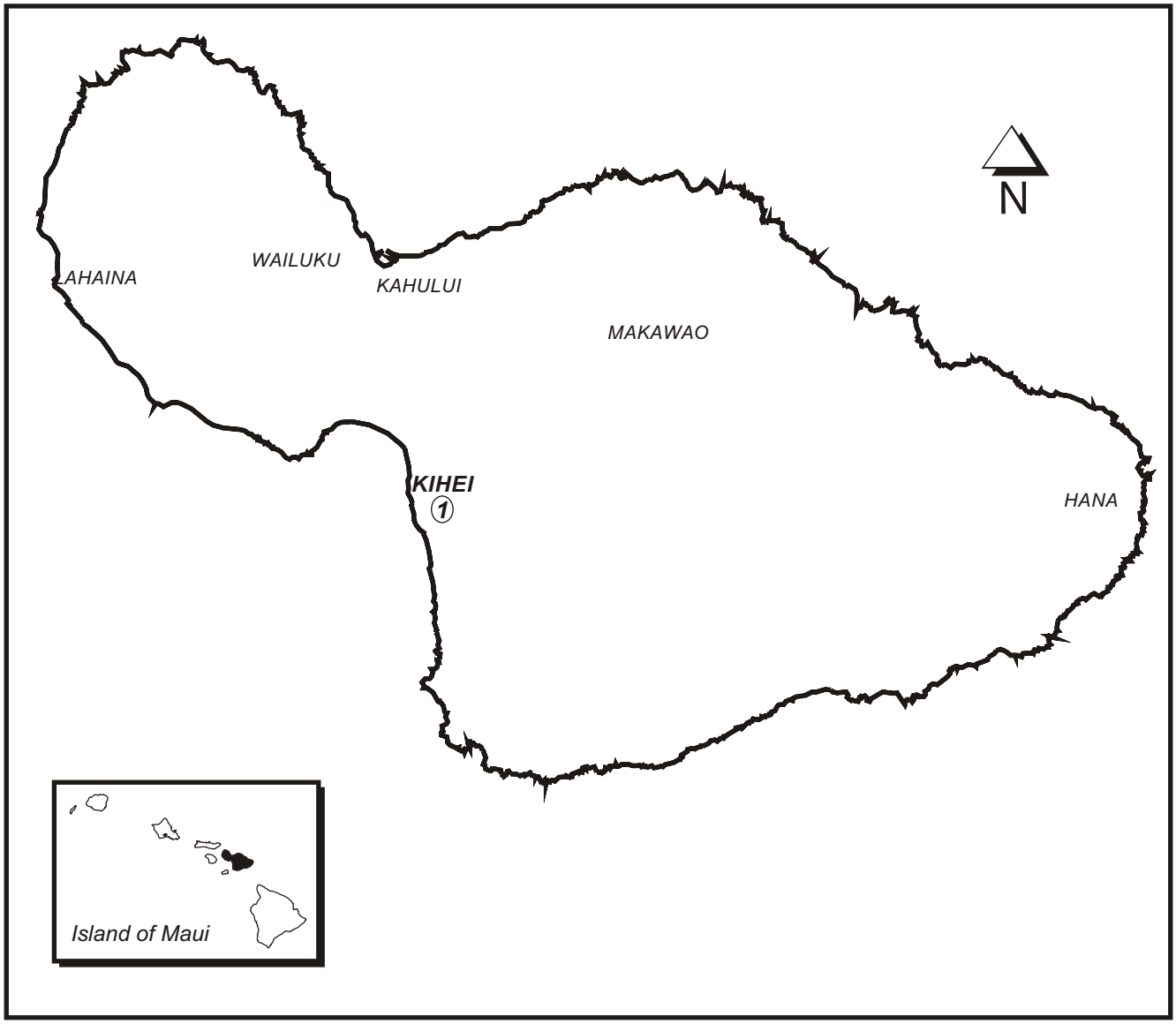
Figure 3-2 **Island of Kauai: Location of Air Monitoring Station**



LEGEND

1 Lihue (PM_{10})

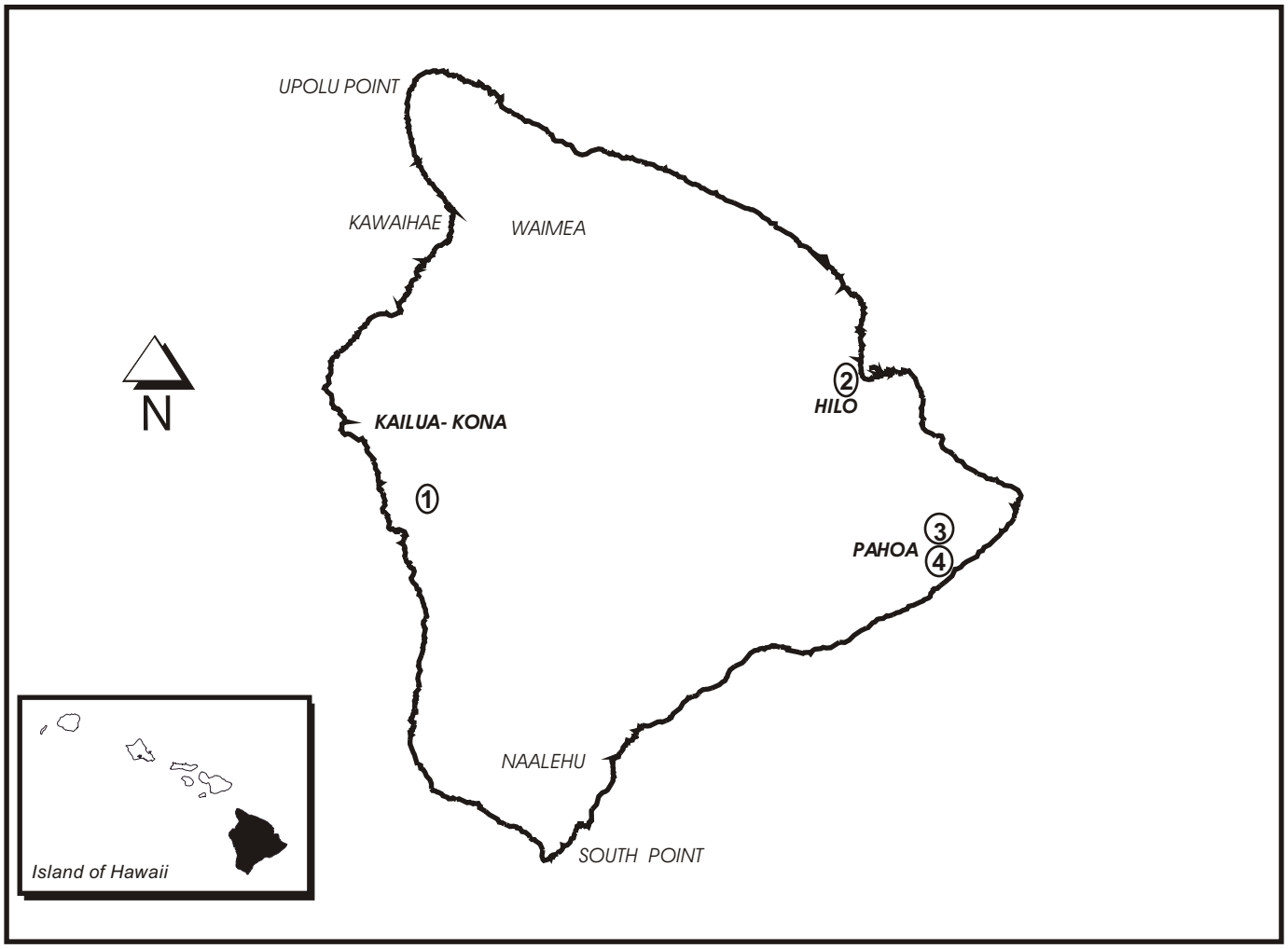
Figure 3-3 **Island of Maui: Location of Air Monitoring Station**



LEGEND

1 Kihei (PM_{10})

Figure 3-4 **Island of Hawaii: Location of Air Monitoring Stations**



LEGEND

1 Kona (SO_2)
2 Hilo (PM_{10}, SO_2)
3 Lava Tree (H_2S)
4 Puna E (H_2S)

Section 4
2002 AIR QUALITY DATA

The Department of Health, Clean Air Branch, has the responsibility for monitoring, protecting and enhancing the state's air quality and regulates and monitors pollution sources to ensure that the levels of criteria pollutants remain well below the state and federal air quality standards. Data collected from the ambient air network is reviewed to ensure that the reported data is of good quality and meets all quality control and assurance requirements.

The following tables summarize the pollutant concentrations measured at each monitoring station. Tables 4-1 through 4-10 are annual summaries grouped by pollutant and provide the number of occurrences exceeding the NAAQS. There is no federal ambient air quality standard for H_2S, and Table 4-10 provides the number of occurrences exceeding the state standard.

The annual statistics provided in tables 4-1 through 4-10 are the highest and second highest $\mu g/m^3$ values recorded in the year for the averaging period, and the annual means, which is the arithmetic mean of all valid hours recorded in the year. The "Possible Periods" is the total number of sampling periods in the year for the averaging time, "Valid Periods" is the total number of acceptable sampling periods after data validation, and "Percent Recovery" represents the amount of quality data reported.

The Kapolei station at 91-591 Kalaeloa Boulevard was shut down and moved approximately 300 yards south to 2052 Lauwiliwili Street. The station began collecting data at the new site on July 26, 2002. The Pearl City station was shut down on August 5 to November 27 due to extensive building renovations; consequently, there were less than 75% data collected for the year 2002 at this station.

Tables 4-11 through 4-20 are monthly summaries of the range and average of each pollutant for each averaging period. The range is the lowest and highest $\mu g/m^3$ values recorded in the month for the averaging period and the average is the arithmetic mean of all hours recorded in the month. The highest value recorded in the year for each site is highlighted.

In the year 2002, the State of Hawaii was in attainment for all federal ambient air quality standards.

Table 4-1 **Annual Summary of 24-Hour PM_{10}**

	----------Annual Statistics----------			----------24-hour Occurrences Greater than 150 µg/m³----------														
	Maximum		Annual Means															
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	90	43	15	0	0	0	0	0	0	0	0	0	0	0	0	365	351	96
Liliha	101	57	16	0	0	0	0	0	0	0	0	0	0	0	0	365	342	94
Waikiki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waimanalo [a]	39	34	12	0	0	0	0	0	0	0	0	0	0	0	0	61	58	95
Pearl City [b]	66	63	15	0	0	0	0	0	0	0	0	0	0	0	0	365	243	67
Makaiwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kapolei [c]	55	35	16	0	0	0	0	0	0	0	0	0	0	0	0	196	195	99
Kapolei - new [c]	44	24	13	0	0	0	0	0	0	0	0	0	0	0	0	158	156	99
West Beach [a]	37	26	13	0	0	0	0	0	0	0	0	0	0	0	0	61	56	92
KAUAI																		
Lihue [a]	27	24	14	0	0	0	0	0	0	0	0	0	0	0	0	61	56	92
MAUI																		
Kihei	95	80	20	0	0	0	0	0	0	0	0	0	0	0	0	365	352	96
HAWAII																		
Kona	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
Hilo [a]	23	18	10	0	0	0	0	0	0	0	0	0	0	0	0	61	59	97
Lava Tree	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puna E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[a] PM_{10} sampling is once every 6th day

[b] The Pearl City station was shut down from 8/5 to 11/27 due to extensive building renovations

[c] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-2 **Annual Summary of 24-Hour $PM_{2.5}$**

	----------Annual Statistics----------			----------24-hour Occurrences Greater than 65 µg/m³----------														
	Maximum		Annual Means															
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	53	28	4	0	0	0	0	0	0	0	0	0	0	0	0	365	348	95
Liliha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikiki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand Island [a]	11	10	5	0	0	0	0	0	0	0	0	0	0	0	0	61	61	100
Waimanalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pearl City [b]	57	37	4	0	0	0	0	0	0	0	0	0	0	0	0	365	186	51
Makaiwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kapolei [c,d]	8	8	4	0	0	0	0	0	0	0	0	0	0	0	0	65	57	88
Kapolei (new) [c,d]	15	9	4	0	0	0	0	0	0	0	0	0	0	0	0	53	26	49
West Beach	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KAUAI																		
Lihue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAUI																		
Kihei [c]	11	10	5	0	0	0	0	0	0	0	0	0	0	0	0	121	115	95
HAWAII																		
Kona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hilo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lava Tree	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puna E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[a] Sampling is once every 6 days

[b] The Pearl City station was shut down from 8/5 to 11/27 due to extensive building renovations

[c] Sampling is once every 3 days

[d] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-3 **Annual Summary of 1-Hour Carbon Monoxide**

	----------Annual Statistics----------			----------1-hour Occurrences Greater than 40,000 µg/m³----------														
	Maximum		Annual Means															
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	3990	3534	734	0	0	0	0	0	0	0	0	0	0	0	0	8760	8628	98
Liliha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikiki	3420	3078	701	0	0	0	0	0	0	0	0	0	0	0	0	8760	8687	99
Sand Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waimanalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pearl City	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Makaiwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kapolei[a]	2166	2052	790	0	0	0	0	0	0	0	0	0	0	0	0	4693	4671	99.5
Kapolei - new[a]	2052	1938	581	0	0	0	0	0	0	0	0	0	0	0	0	3800	3683	97
West Beach	1947	1260	159	0	0	0	0	0	0	0	0	0	0	0	0	8760	8728	99.6
KAUAI																		
Lihue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAUI																		
Kihei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HAWAII																		
Kona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hilo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lava Tree	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puna E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[a] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-4 **Annual Summary of 8-Hour Carbon Monoxide**

	----------Annual Statistics----------			----------8-hour Occurrences Greater than 10,000 µg/m³----------														
	Maximum		Annual Means															
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	1582	1539	734	0	0	0	0	0	0	0	0	0	0	0	0	1095	1092	99.7
Liliha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikiki	1696	1610	701	0	0	0	0	0	0	0	0	0	0	0	0	1095	1086	99
Sand Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waimanalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pearl City	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Makaiwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kapolei [a]	1810	1767	790	0	0	0	0	0	0	0	0	0	0	0	0	587	585	99.7
Kapolei - new [a]	1639	1582	581	0	0	0	0	0	0	0	0	0	0	0	0	475	459	97
West Beach	401	386	159	0	0	0	0	0	0	0	0	0	0	0	0	1095	1092	99.7
KAUAI																		
Lihue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAUI																		
Kihei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HAWAII																		
Kona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hilo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lava Tree	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puna E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[a] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-5 **Annual Summary of 1-Hour Ozone**

	----------Annual Statistics----------			----------1-hour Occurrences Greater than 235 µg/m³----------														
	Maximum		Annual Means															
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liliha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikiki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand Island	106	104	38	0	0	0	0	0	0	0	0	0	0	0	0	8760	8515	97
Waimanalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pearl City	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Makaiwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kapolei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kapolei - new	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West Beach	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KAUAI																		
Lihue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAUI																		
Kihei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HAWAII																		
Kona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hilo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lava Tree	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puna E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 4-6 **Annual Summary of 8-Hour Ozone [a]**

	----------Annual Statistics----------			----------8-hour Occurrences Greater than 157 µg/m³----------														
	Maximum		Annual Means															
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liliha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikiki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand Island	89	88	38	0	0	0	0	0	0	0	0	0	0	0	0	8760	8549	98
Waimanalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pearl City	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Makaiwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kapolei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kapolei - new	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West Beach	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KAUAI																		
Lihue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAUI																		
Kihei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HAWAII																		
Kona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hilo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lava Tree	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puna E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[a] The 8-hour ozone standard is based on running 8-hour averages

Table 4-7 **Annual Summary of 3-Hour Sulfur Dioxide**

	----------Annual Statistics----------			----------3-hour Occurrences Greater than 1,300 µg/m³----------														
	Maximum		Annual Means															
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	30	27	3	0	0	0	0	0	0	0	0	0	0	0	0	2920	2830	97
Liliha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikiki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Waimanalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pearl City	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Makaiwa	50	49	2	0	0	0	0	0	0	0	0	0	0	0	0	2920	2878	99
Kapolei [a]	47	19	2	0	0	0	0	0	0	0	0	0	0	0	0	1565	1346	86
Kapolei - new [a]	7	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1267	1074	85
West Beach	11	9	0	0	0	0	0	0	0	0	0	0	0	0	0	2920	2480	85
KAUAI																		
Lihue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAUI																		
Kihei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HAWAII																		
Kona	50	37	8	0	0	0	0	0	0	0	0	0	0	0	0	2920	2877	99
Hilo	430	376	8	0	0	0	0	0	0	0	0	0	0	0	0	2920	2816	96
Lava Tree	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puna E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[a] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-8 **Annual Summary of 24-Hour Sulfur Dioxide**

	----------Annual Statistics----------			----------24-hour Occurrences Greater than 365 µg/m³----------														
	Maximum		Annual Means															
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	9	8	3	0	0	0	0	0	0	0	0	0	0	0	0	365	363	99.5
Liliha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikiki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waimanalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pearl City	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Makaiwa	13	12	2	0	0	0	0	0	0	0	0	0	0	0	0	365	364	99.7
Kapolei[a]	9	7	2	0	0	0	0	0	0	0	0	0	0	0	0	196	192	98
Kapolei - new[a]	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	158	152	96
West Beach	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	365	363	99.5
KAUAI																		
Lihue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAUI																		
Kihei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HAWAII																		
Kona	19	18	8	0	0	0	0	0	0	0	0	0	0	0	0	365	362	99
Hilo	95	92	8	0	0	0	0	0	0	0	0	0	0	0	0	365	355	97
Lava Tree	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puna E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[a] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-9 **Annual Summary of Nitrogen Dioxide**

	----------Annual Statistics----------			----------Annual Occurrences Greater than 100 µg/m³----------														
	Maximum		Annual Means															
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liliha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikiki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waimanalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pearl City	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Makaiwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Kapolei[a]	-	-	10	-	-	-	-	-	-	-	-	-	-	-	0	4693	4612	98
Kapolei - new[a]	-	-	9	-	-	-	-	-	-	-	-	-	-	-	0	3800	2667	70
West Beach	-	-	8	-	-	-	-	-	-	-	-	-	-	-	0	8760	8553	98
KAUAI																		
Lihue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAUI																		
Kihei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HAWAII																		
Kona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hilo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lava Tree	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puna E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[a] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-10 **Annual Summary of 1-Hour Hydrogen Sulfide**

	----------Annual Statistics----------			----------1-hour Occurrences Greater than 35 µg/m³----------														
	Maximum		Annual Means															
	1st High	2nd High	All Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Possible Periods	Valid Periods	Percent Recovery
OAHU																		
Honolulu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liliha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikiki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waimanalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pearl City	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Makaiwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kapolei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kapolei - new	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West Beach	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KAUAI																		
Lihue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAUI																		
Kihei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HAWAII																		
Kona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hilo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lava Tree	10	8	3	0	0	0	0	0	0	0	0	0	0	0	0	8760	8098	92
Puna E	24	19	2	0	0	0	0	0	0	0	0	0	0	0	0	8760	8183	93

Table 4-11 **Monthly Summary of 24-Hour PM_{10} ($\mu g/m^3$)**

(The month with the highest annual value is highlighted)

Station		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Honolulu	Range	8 - 90	6 - 24	9 - 34	13 - 22	8 - 26	8 - 16	7 - 18	8 - 20	8 - 18	5 - 20	7 - 23	9 - 43
	Average	18	15	18	17	15	12	11	12	13	12	13	17
Liliha	Range	9 - 101	9 - 25	9 - 36	7 - 20	10 - 27	10 - 18	9 - 18	9 - 22	8 - 19	8 - 24	6 - 25	10 - 57
	Average	20	16	19	14	16	14	13	14	15	14	13	18
Pearl City [b]	Range	8 - 63	7 - 25	9 - 36	10 - 21	8 - 26	9 - 16	8 - 19	10 - 13[b]	b	b	8 - 15[b]	10 - 66
	Average	18	15	18	15	15	12	12	11			12	17
Waimanalo [a]	Range	6 - 29	12 - 27	10 - 34	9 - 20	6 - 39	11 - 15	10 - 16	11 - 21	10 - 21	8 - 31	9 - 18	13 - 28
	Average	16	18	19	15	24	13	13	15	15	18	12	19
Kapolei [c]	Range	7 - 55	6 - 30	10 - 35	9 - 25	8 - 23	8 - 18	8 - 17 [c]	c	c	c	c	c
	Average	18	16	19	15	14	13	12					
Kapolei -new [c]	Range	c	c	c	c	c	c	8 - 16 [c]	7 - 20	9 - 16	7 - 17	6 - 24	8 - 44
	Average							12	12	12	12	12	16
West Beach [a]	Range	9 - 21	6 - 18	8 - 26	9 - 20	5 - 18	8 - 11	6 - 10	8 - 17	10 - 14	13 - 37	9 - 14	9 - 22
	Average	12	12	15	13	12	10	8	11	12	19	11	15
Lihue [a]	Range	7 - 23	11 - 24	11 - 20	8 - 17	12 - 20	10 - 16	11 - 14	12 - 16	13 - 18	11 - 17	8 - 14	11 - 27
	Average	17	16	15	13	15	13	12	14	15	13	11	17
Kihei	Range	8 - 25	10 - 29	7 - 32	5 - 24	10 - 22	12 - 41	10 - 32	15 - 49	12 - 52	13 - 34	13 - 51	12 - 95
	Average	16	18	17	15	16	21	20	23	25	21	21	30
Hilo [a]	Range	4 - 11	4 - 14	5 - 23	9 - 11	6 - 18	8 - 11	6 - 10	8 - 14	12 - 14	7 - 16	8 - 16	8 - 12
	Average	7	8	10	10	11	10	8	11	13	11	12	11

[a] Sampling is once every 6th day

[b] The Pearl City station was shut down from 8/5 to 11/27 due to extensive building renovations

[c] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-12 **Monthly Summary of 24-Hour $PM_{2.5}$ ($\mu g/m^3$)**

(The month with the highest annual value is highlighted)

Station		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Honolulu (daily)	Range	2 - 53	2 - 8	2 - 10	2 - 7	1 - 10	1 - 4	1 - 6	2 - 6	2 - 9	1 - 7	1 - 9	2 - 28
	Average	6	4	4	5	4	3	3	3	4	3	3	5
Pearl City [a] (daily)	Range	2 - 37	1 - 7	2 - 9	3 - 7	2 - 9	0 - 5	1 - 6 [a]	a	a	a	a	3 - 57
	Average	6	4	5	4	4	3	3					9
Sand Island (1 in 6 days)	Range	4 - 8	3 - 7	4 - 10	4 - 9	3 - 11	3 - 5	3 - 5	2 - 8	3 - 7	3 - 5	2 - 10	3 - 8
	Average	6	5	7	6	6	4	4	5	5	3	4	4
Kapolei [b] (1 in 3 days)	Range	3 - 6	1 - 6	3 - 8	2 - 5	2 - 8	2 - 7	1 - 4 [b]	b	b	b	b	b
	Average	4	4	4	4	4	3	2					
Kapolei - new [b] (1 in 3 days)	Range	b	b	b	b	b	b	b	b	2 - 9	2 - 3	0 - 15	2 - 8
	Average									4	3	5	4
Kihei (1 in 3 days)	Range	3 - 7	2 - 8	3 - 9	4 - 6	4 - 8	3 - 10	2 - 7	3 - 8	4 - 11	2 - 5	2 - 7	4 - 7
	Average	4	4	6	5	5	5	4	5	5	4	4	5

[a] The Pearl City station was shut down from 8/5 to 11/27 due to extensive building renovations
[b] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-13 **Monthly Summary of 24-Hour Nitrogen Dioxide ($\mu g/m^3$) [a]**

(The month with the highest annual value is highlighted)

Station		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Kapolei [b]	Range	5 - 17	3 - 16	4 - 16	5 - 16	6 - 17	6 - 11	6 - 10 [b]	b	b	b	b	b
	Average	10	10	9	10	10	8	8					
Kapolei - new [b]	Range	b	b	b	b	b	b	6 - 7 [b]	6 - 9	7 - 13	6 - 15	4 - 19	4 - 21
	Average							7	7	10	8	9	11
West Beach	Range	2 - 17	3 - 15	3 - 16	3 - 17	6 - 17	5 - 9	4 - 10	4 - 15	4 - 16	5 - 17	5 - 21	3 - 23
	Average	9	7	8	8	9	7	6	7	8	8	9	10

[a] There is no 24-hour state or federal standard for nitrogen dioxide
[b] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-14 **Monthly Summary of 1-Hour Carbon Monoxide (µg/m³)**

(The month with the highest annual value is highlighted)

Station		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Honolulu	Range	228 - 3990	456 - 2280	570 - 2850	228 - 2850	456 - 2052	228 - 1596	228 - 1254	228 - 1710	342 - 1482	342 - 2052	570 - 2508	228 - 2850
	Average	838	682	934	617	790	714	647	654	655	720	918	630
Waikiki	Range	342 - 2850	342 - 2394	456 - 2394	0 - 2508	228 - 2622	228 - 1026	342 - 1596	342 - 1938	570 - 2394	342 - 2166	342 - 3420	0 - 3078
	Average	1005	666	836	705	602	494	575	696	896	660	743	531
Kapolei [a]	Range	342 - 1824	342 - 1824	456 - 2052	228 - 2052	228 - 2166	228 - 1596	0 - 1368	a	a	a	a	a
	Average	635	601	1036	1044	240	669	765 [a]					
Kapolei - new [a]	Range	a	a	a	a	a	a	228 - 1824	114 - 1596	114 - 2052	114 - 1938	0 - 1938	114 - 1254
	Average							258 [a]	512	669	736	726	332
West Beach	Range	0 - 1947	0 - 1031	0 - 458	0 - 573	0 - 573	115 - 229	115 - 573	0 - 458	115 - 573	115 - 802	0 - 573	115 - 1260
	Average	138	165	139	126	170	144	207	118	186	224	132	158

[a] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-15 **Monthly Summary of 8-Hour Carbon Monoxide (µg/m³)**

(The month with the highest annual value is highlighted)

Station		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Honolulu	Range	257 - 1582	456 - 1069	627 - 1382	385 - 1283	542 - 1211	314 - 1026	407 - 998	356 - 1159	399 - 955	470 - 1325	698 - 1411	328 - 626
	Average	840	682	934	615	790	717	646	653	656	721	918	626
Waikiki	Range	499 - 1696	371 - 1292	470 - 1382	143 - 1297	371 - 1468	356 - 613	413 - 1040	513 - 1283	327 - 1439	428 - 1539	442 - 1368	114 - 1582
	Average	1006	668	836	705	602	495	575	696	896	658	743	529
Kapolei [a]	Range	356 - 1112	342 - 1112	513 - 1767	371 - 1810	242 - 1511	257 - 1354	407 - 1154	a	a	a	a	a
	Average	635	601	1035	1044	789	669	769 [a]					
Kapolei - new [a]	Range	a	a	a	a	a	a	228 - 328	157 - 1582	157 - 1468	114 - 1639	214 - 1382	114 - 556
	Average							245	511	689	735	725	333
West Beach	Range	72 - 386	0 - 344	0 - 315	72 - 315	14 - 286	115 - 229	115 - 301	0 - 329	115 - 315	115 - 401	72 - 229	115 - 329
	Average	138	164	139	126	170	144	207	118	185	223	132	158

[a] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-16 **Monthly Summary of 1-Hour Ozone (µg/m^3)**

(The month with the highest annual value is highlighted)

Station		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Sand Island	Range	2 - 92	2 - 88	2 - 92	2 - 106	6 - 71	4 - 76	4 - 76	2 - 47	0 - 98	2 - 88	4 - 92	2 - 104
	Average	41	46	46	39	30	37	27	24	36	33	43	50

Table 4-17 **Monthly Summary of 8-Hour Ozone (µg/m^3)**

(The month with the highest annual value is highlighted)

Station		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Sand Island	Range	2 - 78	6 - 79	4 - 85	5 - 89	6 - 60	7 - 67	5 - 72	3 - 27	4 - 69	2 - 80	5 - 78	6 - 88
	Average	41	52	46	39	31	37	27	24	36	33	43	50

Table 4-18 **Monthly Summary of 1-Hour Hydrogen Sulfide (µg/m^3)**

(The month with the highest annual value is highlighted)

Station		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Lava Tree	Range	4 - 6	1 - 6	4 - 6	0 - 6	0 - 4	0 - 4	0 - 10	0 - 6	0 - 7	0 - 6	1 - 6	1 - 4
	Average	4	4	5	2	2	2	3	2	4	4	3	3
Puna E	Range	1 - 4	1 - 3	1 - 24	1 - 4	1 - 4	0 - 4	0 - 3	0 - 3	0 - 3	1 - 19	1 - 3	1 - 14
	Average	2	2	2	2	3	2	0	1	1	2	3	3

Table 4-19 **Monthly Summary of 3-Hour Sulfur Dioxide (µg/m^3)**

(The month with the highest annual value is highlighted)

Station		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Honolulu	Range	3 - 30	3 - 10	3 - 27	0 - 6	0 - 18	3 - 13	1 - 4	0 - 3	0 - 17	2 - 6	3 - 10	3 - 27
	Average	3	3	3	0	2	3	3	0	1	3	3	3
Makaiwa	Range	0 - 34	0 - 43	0 - 49	0 - 44	0 - 17	0 - 8	0 - 20	0 - 30	0 - 19	0 - 35	0 - 50	0 - 34
	Average	2	2	4	4	2	0	1	1	1	1	2	2
Kapolei [a]	Range	0 - 10	0 - 47	0 - 7	0 - 10	0 - 10	0 - 3	3 - 6	a	a	a	a	a
	Average	1	1	1	1	2	3	3 [a]					
Kapolei - new [a]	Range	a	a	a	a	a	a	a	0 - 2	0 - 3	0 - 7	0 - 3	0 - 5
	Average								0 [a]	0	0	0	0
West Beach	Range	0 - 11	0 - 3	0 - 0	0 - 4	0 - 3	0 - 3	0 - 1	0 - 3	0 - 5	0 - 1	0 - 4	0 - 3
	Average	0	0	0	0	0	0	0	0	0	0	0	0
Kona	Range	8 - 27	8 - 22	8 - 28	8 - 34	0 - 27	0 - 24	2 - 31	1 - 30	2 - 50	1 - 30	3 - 35	3 - 34
	Average	9	10	11	12	7	5	7	8	8	7	7	9
Hilo	Range	0 - 200	3 - 138	3 - 142	3 - 46	3 - 223	0 - 14	0 - 11	3 - 29	3 - 50	0 - 294	0 - 430	1 - 293
	Average	10	7	9	6	7	5	5	5	6	10	16	10

[a] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Table 4-20 **Monthly Summary of 24-Hour Sulfur Dioxide (µg/m^3)**

(The month with the highest annual value is highlighted)

Station		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Honolulu	Range	3 - 8	3 - 6	3 - 7	0 - 4	0 - 7	3 - 4	2 - 3	0 - 3	0 - 4	3 - 4	3 - 5	3 - 9
	Average	3	3	3	0	2	3	3	0	1	3	3	3
Makaiwa	Range	0 - 10	0 - 11	0 - 13	1 - 11	0 - 6	0 - 2	0 - 3	0 - 7	0 - 3	0 - 7	0 - 11	0 - 9
	Average	2	2	4	4	2	0	1	1	1	1	2	2
Kapolei [a]	Range	0 - 7	0 - 9	0 - 3	0 - 2	0 - 5	1 - 3	3 - 3	a	a	a	a	a
	Average	1	1	1	1	3	3	3					
Kapolei - new [a]	Range	a	a	a	a	a	a	a	0 - 0	0 - 2	0 - 2	0 - 1	0 - 2
	Average								0	0	0	0	0
West Beach	Range	0 - 2	0 - 1	0 - 0	0 - 1	0 - 0	0 - 1	0 - 0	0 - 1	0 - 1	0 - 0	0 - 1	0 - 1
	Average	0	0	0	0	0	0	0	0	0	0	0	0
Kona	Range	8 - 12	8 - 14	8 - 18	9 - 19	2 - 13	2 - 8	3 - 12	4 - 15	4 - 17	3 - 13	4 - 16	5 - 15
	Average	9	10	11	12	7	5	7	8	8	7	7	9
Hilo	Range	3 - 46	3 - 36	3 - 37	3 - 14	4 - 40	0 - 8	0 - 6	4 - 8	4 - 21	1 - 84	0 - 95	2 - 69
	Average	11	7	9	6	7	5	5	5	6	10	16	10

[a] The Kapolei station was shut down on 7/15 and began operation at the new site on 7/26

Section 5
AMBIENT AIR QUALITY TRENDS

The following graphs illustrate 5-year trends for PM_{10}, ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide from 1998 to 2002.

The graphs for PM_{10}, sulfur dioxide and nitrogen dioxide (figures 5-1, 5-2, 5-5 and 5-6, respectively) represent the annual averages for each year and for each station that monitors for that pollutant. Annual averages are derived by calculating the arithmetic mean of all valid hours recorded in the year. Included in the graphs are the state and federal annual standard(s).

The graphs for 1-hour ozone and 1-hour carbon monoxide (figures 5-3 and 5-4, respectively) represent the average of the daily maximum 1-hour values recorded in the year. These values are obtained by taking the highest recorded 1-hour value for each day then calculating the arithmetic mean of all those hours to arrive at the annual maximum average. Ozone and carbon monoxide do not have state or federal annual standards, however, included in the graphs are the 1-hour standards.

Air quality in the State of Hawaii continues to be one of the best in the nation and criteria pollutant levels remain well below state and federal ambient air quality standards.

Figure 5-1 **Island of Oahu: PM_{10} Annual Average 1998 - 2002**

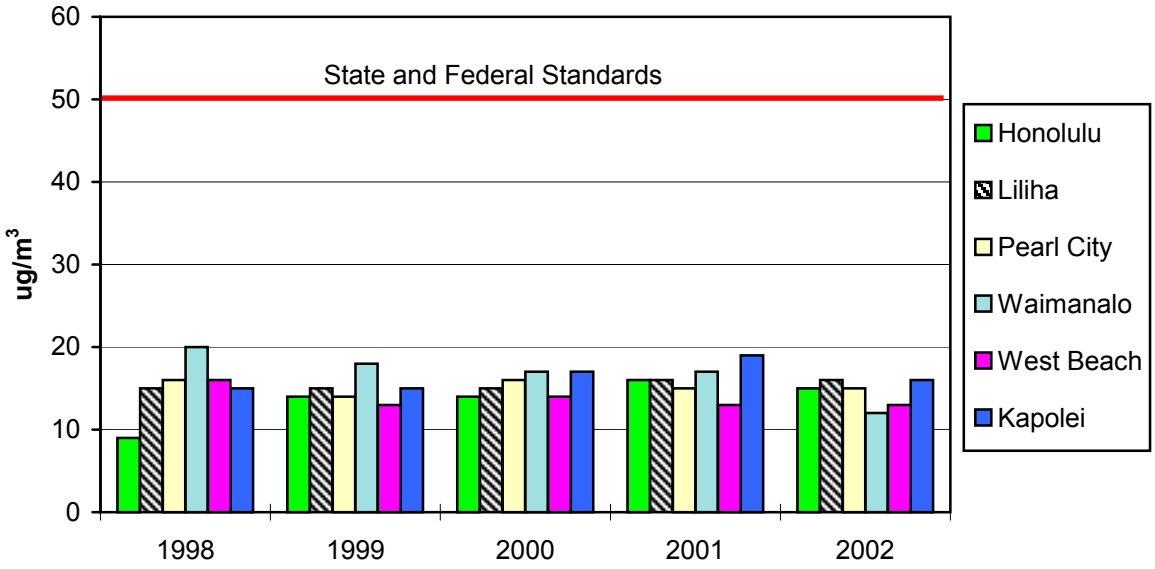


Figure 5-2 **Island of Kauai: PM_{10} Annual Average 1998 - 2002**

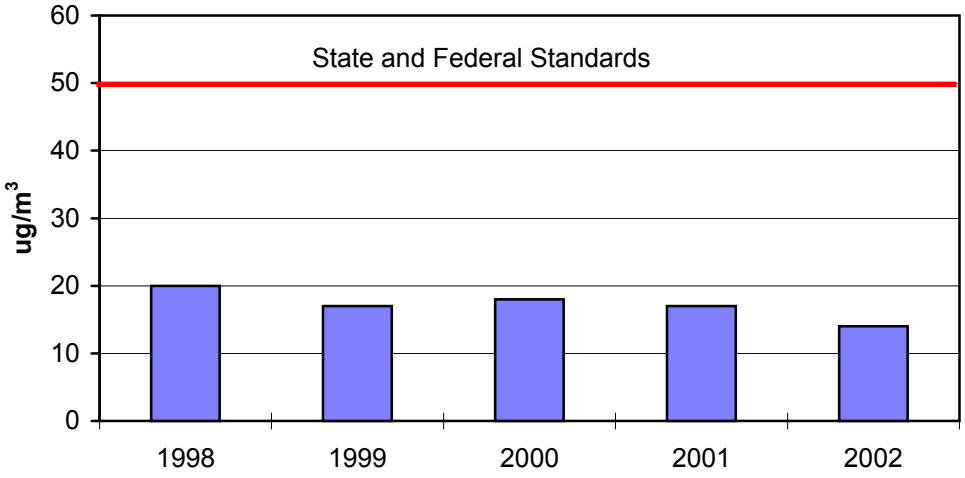


Figure 5-3 **Annual Average of Daily Maximum 1-Hour Ozone 1998 - 2002**

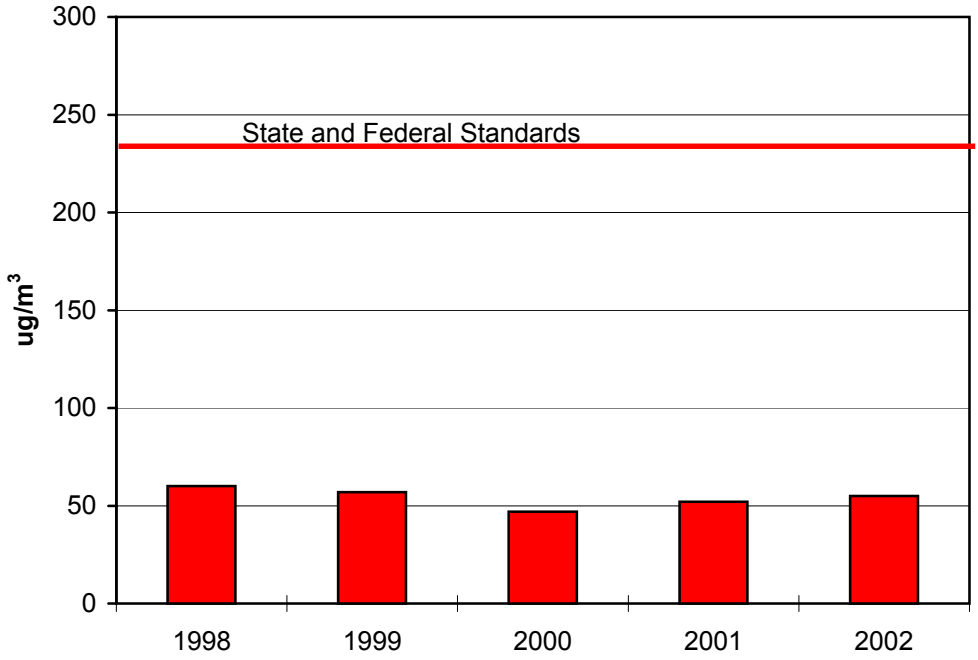


Figure 5-4 **Annual Average of Daily Maximum 1-Hour Carbon Monoxide 1998 - 2002**

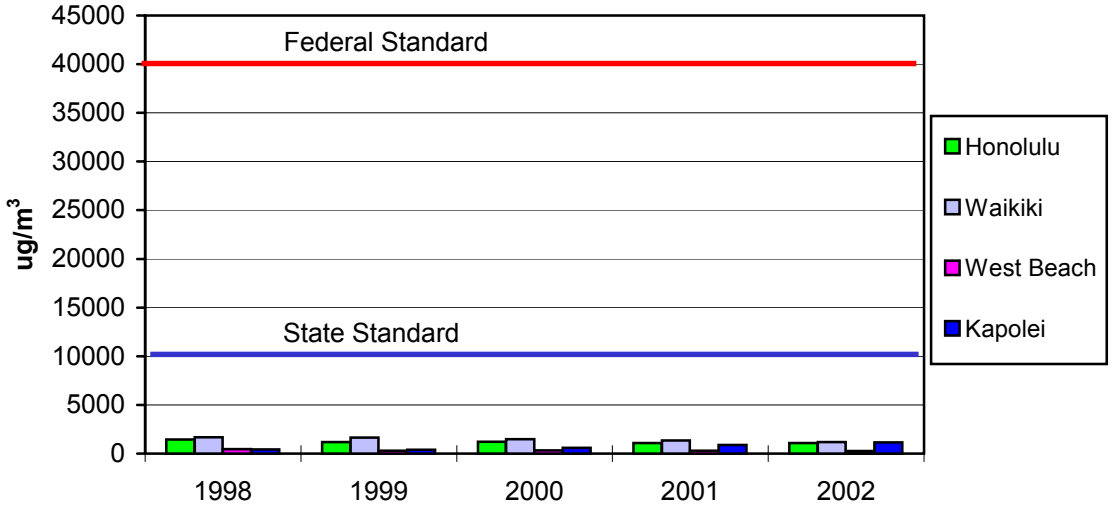


Figure 5-5 **Annual Average Sulfur Dioxide 1998 - 2002**

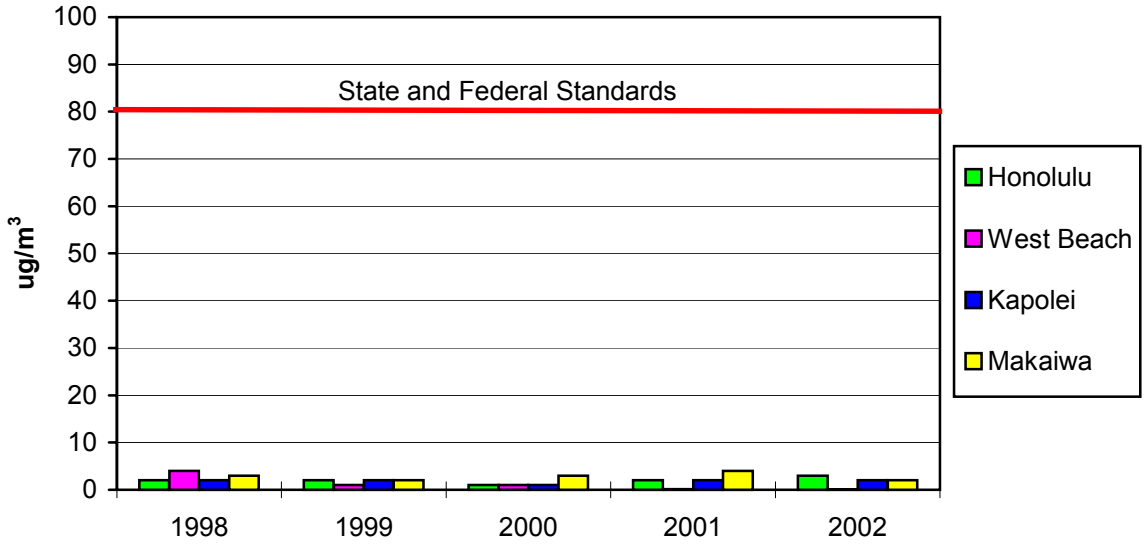


Figure 5-6 **Annual Average Nitrogen Dioxide 1998 - 2002**